

1.1 Radio Astronomy

1.1.1 Maintenance and Calibration

- MarkIV Data Acquisition Terminal maintenance: during Clock Sync performed on DOY 072 it was noticed very low amplitude phase calibration tones at Video Converter 03 (lower side band). It was replaced by the hot spare and problem was solved.
- Tested sidereal_aca TDN connection block to support Reference Frame Calibration (RFC) experiments with DSS63 and DSS65 antennas. The script does not properly configure the subreflector for this type of supports. It has been locally modified to solve this problem (ATOT Devel DSS65 DOY 084).
- Development and testing of several TDN connection blocks to support VLBI observations.
- Updated L-band calibration file (Field System rxg file) in preparation for incoming EVN and Global Services (EGS) support. Performed several Field System onoffs over 3C48 source to compute noise diode temperature variation versus frequency (EGS Calibration DSS63 DOY 063). New file was derived using *gnplt* application. System temperature file was derived using *antabfs* application. Observing log was modified using *toflagr* script to be able to provide uvflag files, using the scripts *uvflg.pl* and *uvflgplot.pl* provided by JIVE correlator.
- Q-band performance measurements (ATOT Devel DSS54 DOY 070, STA DIR DSS54 DOY 071). Several upgrades were performed to the system with the help of Manuel Franco. Reasonably good system temperatures and linearities are now obtained for both polarizations. Drive unit failed on DOY 076, waiting for a replacement from JPL.
- In preparation for new Mark5 software installation (Debian Etch OS and latest Mark5 operational s/w) the new motherboard Tyan Tiger i7230D has been successfully installed on Mark5 recorder #2. This motherboard will allow us to participate in high speed real time data transfers (e-VLBI).

1.1.2 RA meetings and training courses

RA department participated in the Observational Training Course imparted at MDSCC to graduate students from Master of Astrophysics in Comunidad de Madrid (GBRA Host Country DSS63 DOY 073). The students observed known water masers in different objects (Orion Nebula, M42, RLeo, etc.). The data has been analyzed and reduced by the students with the help of the Host Country group.

CGM gave an invited talk with the title “*She is an Astronomer*” organized by Fundacion AstroHita (<http://www.fundacionastrohita.org/>) in Toledo, March 6th. The talk was organized because of the International Year of Astronomy 2009, in the attempt to encourage females to enrol in science careers and promote gender equality.

Published proceedings from the *Fourth Workshop on Compact Steep Spectrum and GHz-Peaked Spectrum Radio Sources*, held in Riccione, Italy, from May 26 to 29, 2008. Ra Department contribution has been published with the title “Studies of CSS/GPS sources with the Deep Space Network antennas in Madrid”, Garcia-Miro, C

and Moll, E and Vazquez, M and Kuiper, T.B.H., Astronomische Nachrichten, Vol.330, Issue 2, p.137.

RA department attended the Frequency Reference Selection (FRS) and Frequency Reference Distribution (FRD) training course imparted at MDSCC.

1.1.3 Observations

1.1.3.1 Host Country Spectroscopy

During this month spectroscopy observations with DSS-63 antenna were carried out using the SPB500 spectrometer and the MarkIV data acquisition terminal. Following Host Country projects were performed using DSS-63 antenna:

- **D63-S01:** study of CCS molecule (22.334 GHz) extended emission in young low-mass proto-stars. The CCS molecule is abundant in molecular clouds during the first stages of star formation. We plan to make maps of its emission in several star-forming regions, to study their physical conditions and chemical processes in the cloud.
- **D63-S07:** search and study of the ammonia emission in the environments of evolved massive stars, particularly LBVs and Wolf-Rayet.
- **D63-S10:** search for chemical differences in different positions of a LBV nebula.

DOY	minutes scheduled	minutes used	Percent good data	Activity	comments
064	210	190	0	"GBRA H/C D63-S01"	weather
073	335	320	70	"GBRA H/C graduate course training"	OK
080	270	245	80	"GBRA H/C D63-S01/S07"	OK
085	100	85	100	"GBRA H/C D63-S010"	OK
086	305	90	30	"GBRA H/C D63-S01/S10"	weather, EAC software

1.1.3.2 Interferometry

MDSCC participated in 4 Very Long Baseline Interferometric (VLBI) observations (804 min in total):

- RFC Clock Synchronization on DSS-65 (3 observations; 584 min): 100% data collected; performance of the system nominal, except for second observation that it was noticed a problem with MarkIV DAT video converter #03. Problem was solved before last observation.
- European VLBI Network (EGS project) on DSS-63 (1 observation; 220 min): 100% data collected, performance of system nominal. Observing log, calibration and uvflag files were sent to the correlator.